

# Miniature UAV Wind LIDAR & Flight Extension System Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)



## ABSTRACT

Systems & Processes Engineering Corporation and Texas A&M University propose a Wind Measurement LIDAR System for extending the flight duration or decreasing fuel consumption on UAVs and light aircraft. The system uses a fiber optic based, eye-safe wind LIDAR from another NASA effort, combined with previous software studies on an Army program to yield a system capable of increasing fuel economy by up to 20% by optimally moving control surfaces in response to thermals and wind gusts, seen by the wind LIDAR. The system also plots the optimum course through thermals and wind gust for maximum dwell time or fuel economy. The sensor assembly is composed of a wind LIDAR using fiber optic transceiver operating at eye-safe 1550nm. This LIDAR allows air current Doppler detection beyond 3km and fine range resolution by using pulse compression. The LIDAR was sized to detect energy sources, vertical uplifts, wind direction, wind gradients and transient gusts, for energy conservation in UAVs

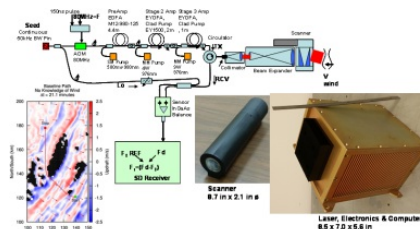
## ANTICIPATED BENEFITS

### To NASA funded missions:

Potential NASA Commercial Applications: The wind measurements LIDAR System can be used for optimal flight path for energy conservation, soaring and extended dwell time for UAVs. It can be used for measurement systems on a variety of unmanned aircraft. It can be used in programs like 3D-WINDS. The system is small enough so that with radiation hardening, it can be used in various planetary missions

### To the commercial space industry:

Potential Non-NASA Commercial Applications: Commercial applications include air turbulence sensing for commercial aircraft. Other applications, studied in past programs, are using the wind LIDAR to determine an optimal path for maximum fuel economy and/or station keeping for UAVs and aircraft.

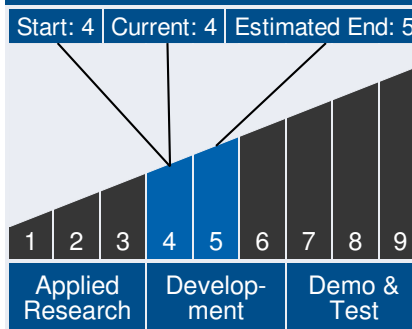


Miniature UAV Wind LIDAR & Flight Extension System

## Table of Contents

Abstract . . . . .	1
Anticipated Benefits . . . . .	1
Technology Maturity . . . . .	1
Management Team . . . . .	1
U.S. Work Locations and Key Partners . . . . .	2
Technology Areas . . . . .	2
Details for Technology 1 . . . . .	2

## Technology Maturity



## Management Team

### Program Executive:

- Joseph Grant

### Principal Investigator:

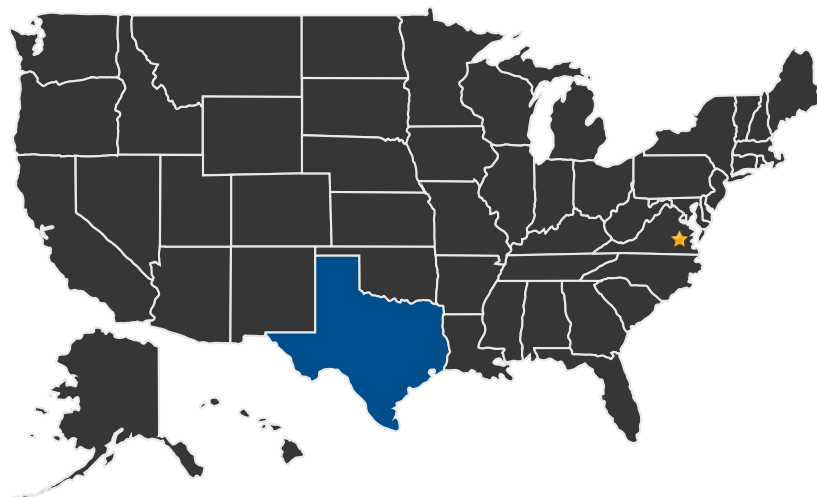
- Brad Sallee

# Miniature UAV Wind LIDAR & Flight Extension System Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)



## U.S. WORK LOCATIONS AND KEY PARTNERS



■ U.S. States  
With Work

★ **Lead Center:**  
Langley Research Center

### Other Organizations Performing Work:

- Systems & Processes Engineering Corp (Austin, TX)

## PROJECT LIBRARY

### Presentations

- Briefing Chart
  - (<http://techport.nasa.gov:80/file/17900>)

## DETAILS FOR TECHNOLOGY 1

### Technology Title

Miniature UAV Wind LIDAR & Flight Extension System

### Technology Areas

Science Instruments,  
Observatories, and Sensor  
Systems (TA 8)

- └ Remote Sensing Instruments  
and Sensors (TA 8.1)
  - └ 355 nm, Single-Frequency  
Pulsed Laser (TA 8.1.5.2)